

# Elementary/Middle School STEM Full Implementation

## Full Implementation

Whole school or district STEM initiatives. This is a non-traditional model of education in which the classroom resembles a work environment and students contribute to solving problems in the community. STEM careers, experiences, and skills drive the curriculum. Curriculum is integrated in authentic problem-based learning that is STEM career oriented and cross disciplinary. Students collaborate in teams to solve problems. Teachers facilitate teams of students towards solving problems and developing work force skills, commonly the skills required by STEM businesses in that area or region. Frequently, schools have partnerships with businesses to provide materials, resources, and capital.

## Infrastructure

Full STEM implementation is a highly collaborative environment between teachers, students, staff, and community. Teachers have common planning times in order to collaborate. Teachers may be offered the freedom to partner with each other to create new STEM opportunity classes. Administrators and Teachers collaborate with external school partners to integrate those opportunities in the classroom. **The established Leadership Team provides guidance to the school staff, parents and community.**

<u>Action Items</u>	<u>Metric</u>
Collaborative leadership team (which can include representative from school, district, school board, community, higher education, and STEM industry) develops a shared mission and vision, high expectations for students, end of program goals, and structures for collaboration time and professional learning	<ul style="list-style-type: none"> <li>• Vision and mission are clearly defined and communicated to all stakeholders.</li> <li>• Student expectations are shared with teachers, parents, and community members.</li> <li>• A schedule for collaborative time and plan for professional learning is in place.</li> <li>• Leadership team meets on a regular basis to monitor program goals and provide guidance and support.</li> <li>• List and summary of research included in developed implementation plan that will connect to all aspects of implementation</li> </ul>
Professional learning communities define roles and responsibilities that align to the mission, vision, goals, and expectations	<ul style="list-style-type: none"> <li>• Professional Learning Communities are created with a clearly outlined set of roles and responsibilities.</li> </ul>
Establish teams of teachers and school administrators to address specific STEM school needs, e.g., technology, behavior management, community partnerships/engagement, etc.	<ul style="list-style-type: none"> <li>• Flow chart of teacher teams showing roles and responsibilities and working towards common vision</li> <li>• 100% teacher participation</li> </ul>
School teams establish communication and engagement efforts for parents and community members that elicit feedback from all stakeholders	<ul style="list-style-type: none"> <li>• Community engagement plan</li> <li>• Newsletters</li> <li>• Website</li> <li>• Social Media</li> <li>• Informational documentation</li> </ul>

	<ul style="list-style-type: none"> <li>• Parent/community surveys</li> </ul>
Laboratory space, resources, and supplies are identified and included in implementation	<ul style="list-style-type: none"> <li>• Classrooms are stocked and set up by the beginning of the school year.</li> </ul>
Develop intensive programs to train or refresh new and existing staff	<ul style="list-style-type: none"> <li>• Schedule of STEM related professional development activities</li> </ul>
A strategic plan exists for a natural progression into course/classrooms from grade to grade and subject to subject	<ul style="list-style-type: none"> <li>• Curriculum maps and progressions</li> <li>• Time for planning vertically with other teachers included in schedule</li> </ul>
School schedules allow for adequate time for projects, teacher planning, and non-traditional courses	<ul style="list-style-type: none"> <li>• School schedule is adequate for STEM education</li> <li>• Schedules are prepared in advance of the school year</li> </ul>
Identify ways in which courses and curriculum can be integrated across multiple STEM disciplines and allow for co-teaching of the material	<ul style="list-style-type: none"> <li>• Schedule teacher preparation period and courses together that will require co-teaching. Also begin using common planning spaces for further collaboration</li> <li>• STEM curriculum team identifies integrative curriculum and provides support to teachers and staff around STEM instruction</li> </ul>
Identify and adopt appropriate technologies aligned to your school's curriculum as well as the your regional workforce needs	<ul style="list-style-type: none"> <li>• Technology needs assessment</li> <li>• Funds/budget aligned for programs, technology, and partnerships</li> </ul>
Arrange classrooms for collaboration and lab or project based experiences	<ul style="list-style-type: none"> <li>• Classrooms have tables and lab benches for students instead of individual desks</li> </ul>
Leadership team regularly evaluates program effectiveness	<ul style="list-style-type: none"> <li>• Data Analysis meetings</li> <li>• Regularly scheduled meetings among leadership, teachers, parents, and community</li> </ul>

## **Instruction**

**Students engage in project-based learning that offers real world, relevant and complex problems. This may include internships, co-ops, work studies, mentorships, and job shadowing. Classrooms are facilitated by teachers who guide students to ask questions, research, solve problems and develop new technologies. This method of learning is offered to the whole student body. Full STEM implementation is a highly collaborative environment between teachers, students, staff, and community. Teachers have common planning times in order to collaborate and reflect on instruction. Teachers may be offered the freedom to partner with each other to create new STEM opportunity classes; for example, the opportunity to write grants and create new technologies. This might team an English teacher with an engineering teacher. Teachers collaborate with external school partners to integrate those opportunities in the classroom. Students work in teams towards goals. Students collaborate with teachers, often changing the traditional teacher-student relationship to a more collegial relationship.**

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Facilitate student participation in problem based learning through STEM investigations, open-ended inquiry, and authentic, real world problems	<ul style="list-style-type: none"><li>• Increased students' time on task and student engagement</li><li>• Use of student self-reflection and assessment</li><li>• Observation of student approaches to investigation of a problem to include collaboration, questioning, data, communication, evidence-based claims, and critical thinking</li></ul>
Use innovative and non-traditional instructional strategies for learning in an integrated educational environment, such as a "flipped classroom" or virtual learning days	<ul style="list-style-type: none"><li>• Curriculum leadership team identifies instructional strategies appropriate for STEM education and project based learning</li><li>• Teachers are provided training for these strategies</li></ul>
Professional development of teachers that provides cross-curricular teamwork and planning	<ul style="list-style-type: none"><li>• Calendar of professional learning activities</li><li>• Peer observation and dialogue</li><li>• Lesson studies</li></ul>
Develop strategies for identifying student abilities, interests, and strengths for continued engagement	<ul style="list-style-type: none"><li>• Data driven decisions; data meetings</li><li>• Teacher/student conferencing and survey data</li></ul>
Employ Contextual learning, Problem-based learning, Project-based learning, and Inquiry-based learning	<ul style="list-style-type: none"><li>• School-wide instructional practice</li><li>• Teacher professional development</li><li>• Teacher collaboration and dialogue</li></ul>
Identify local/regional STEM employment needs and ensure instruction models the skills needed by industry	<ul style="list-style-type: none"><li>• Needs assessment surveying community and businesses, analyze results, and incorporate in school STEM plan</li></ul>
Utilizes a variety of technologies that are embedded into the instructional process	<ul style="list-style-type: none"><li>• Teacher models the use of technology</li><li>• Varied tools are included and available for student use</li><li>• Students are using technology tools most of the time in daily work.</li></ul>
Addresses learning gaps and opportunities for higher learning	<ul style="list-style-type: none"><li>• Intervention plan</li><li>• High ability plan</li><li>• Individual student learning plans</li></ul>
Increase teacher's content knowledge in the fields of STEM, providing explicit instruction on how to integrate content with PBL	<ul style="list-style-type: none"><li>• Align professional development with the instructional calendar</li><li>• Specific instruction to teachers in STEM content</li></ul>

## Curriculum

**Courses must be aligned to Indiana Academic Standards and Indiana's Common Core Standards. However, the school may create new courses that integrate standards from multiple courses that may span a year or more. Schools may offer licensing, certifications, and possibly associate degrees. These schools offer college-level coursework and workforce skill development. Schools are innovative with scheduling. Classes may be several hours or possibly even the whole day. Courses are strategically scheduled to provide a natural progression from subject to subject. Courses may be combined with multiple teachers spanning multiple periods.**

<u>Action Items</u>	<u>Metric</u>
Adopt inquiry and/or project- based curriculum or modify existing curriculum	<ul style="list-style-type: none"><li>• Consistently utilize Inquiry and PBL</li></ul>
Interdisciplinary STEM content is the focus of the school curriculum	<ul style="list-style-type: none"><li>• Curriculum maps reflect STEM focus</li><li>• Concept maps the explicitly show the points of integration in the curriculum</li></ul>
Develop a well-defined set of learning objectives that support teaching for deeper understanding of STEM based on current research on how students learn	<ul style="list-style-type: none"><li>• School based learning objectives</li><li>• Student Learning Objectives for STEM education</li></ul>
Develop a comprehensive K-12 alignment of STEM Standards and assessments	<ul style="list-style-type: none"><li>• STEM progressions through middle and high school</li></ul>
Curriculum is aligned to Common Core State Standards and Next Generation Science Standards, or the state's adopted standards	<ul style="list-style-type: none"><li>• Curriculum maps</li></ul>
Curriculum is connected to real-world contexts and careers in STEM fields, aligned to local or regional needs	<ul style="list-style-type: none"><li>• Curriculum maps reflect this connection</li><li>• Curriculum provides instruction on STEM workforce skills</li></ul>
Research based authentic and integrated assessments are utilized to capture student learning and growth	<ul style="list-style-type: none"><li>• Pre/post tests</li><li>• Innovative or non-traditional assessments</li></ul>
Develop a technology curriculum that can be integrated across all disciplines	<ul style="list-style-type: none"><li>• Curriculum map of technology skills and tools at every level</li><li>• Identified list of tools at all levels that align with curriculum expectations</li></ul>
Opportunities exist for guest speakers, field work, and application of concepts	<ul style="list-style-type: none"><li>• Calendar of in-school and out-of-school opportunities for students</li><li>• Partnerships with business and community</li></ul>

## **Extended Learning**

Learning does not stop at the end of the school day. This type of school offers opportunities outside of the classroom and school through afterschool programs, volunteering, work studies, etc. Often the school staff participates in or even runs the programs for extended learning.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Identify and partner with after school providers to continue educational opportunities in the after school setting	<ul style="list-style-type: none"><li>• Leadership team identifies approved after school programs</li><li>• School provides facilities for conducting after school programs or identifies satellite locations and provides transportation for students</li></ul>
Alignment of the school curriculum and schedule to allow for extended learning activities to continue the work of the school day	<ul style="list-style-type: none"><li>• Transportation opportunities exist for all students</li><li>• Curriculum extension documents connecting in-school curriculum to extended day learning</li></ul>
Bridge and connect in-school and out-of-school learning opportunities	<ul style="list-style-type: none"><li>• Extended Learning curriculum maps</li><li>• Opportunities for after school staff to work with teaching staff</li></ul>
Extended day curriculum is research-based and offered to all students	<ul style="list-style-type: none"><li>• After school program adopts inquiry or project based learning</li></ul>
Parents and community members are included in extended day learning	<ul style="list-style-type: none"><li>• Newsletters, websites, and social networks are utilized to provide information to stakeholders</li><li>• Parents and community members participate in the activities</li></ul>
All students are afforded the opportunity to participate in extended learning but school uses data to identify specific students who could benefit most and encourage participation	<ul style="list-style-type: none"><li>• Struggling students participate in extended learning opportunities</li><li>• General population of students participate as desired</li></ul>
Modify the school day to allow teachers to participate in the after school activities	<ul style="list-style-type: none"><li>• Develop a calendar of participation and appropriately adjust the work day to include after school activities during designated times and events</li></ul>

# Elementary/Middle School STEM Partial Implementation

## Partial Implementation

This is a non-traditional school experience. STEM experiences and related skills are integrated into the curriculum. The STEM program may be school wide, with teachers collaborating across disciplines for long term projects or a school-within-a-school scenario. These projects may be in addition to the normal curriculum or used to enhance the educational process. This may also include a school in which only a portion of the student body participates in these long term projects, interdisciplinary learning, or STEM career-based courses in CTE. Frequently the schools maintain business partnerships for materials, resources, and capital. The established Leadership Team provides guidance to the school staff, parents and community.

## Infrastructure

Partial STEM implementation has highly collaborative environment between teachers, students, staff, and community. Teachers involved in the STEM Implementation may have common planning times in order to collaborate. Teachers may be offered the freedom to partner with each other to create new STEM opportunity classes. **The leadership team will provide guidance and support to faculty, as well as, provide communication to students, the community and businesses.**

<u>Action Items</u>	<u>Metric</u>
Identify and implement modifications to school structure and schedule in order to accommodate STEM educational programming within the larger school or school district	<ul style="list-style-type: none"> <li>Meet with community, school board, students, and parents to determine the school structure</li> </ul>
Collaborative leadership team (which can include representative from school, district, school board, community, higher education, and STEM industry) develops a shared mission and vision, high expectations for students, end of program goals, and structures for collaboration time and professional learning	<ul style="list-style-type: none"> <li>Vision and mission are clearly defined and communicated to all stakeholders.</li> <li>Student expectations are shared with teachers, parents, and community members.</li> <li>A schedule for collaborative time and plan for professional learning is in place.</li> <li>Leadership team meets on a regular basis to monitor program goals and provide guidance and support.</li> <li>List and summarize research included in developed implementation plan that will connect to all aspects of implementation</li> </ul>
Professional learning communities define roles and responsibilities that align to the mission, vision, goals, and expectations	<ul style="list-style-type: none"> <li>Professional Learning Communities are created with a clearly outlined set of roles and responsibilities.</li> </ul>
Laboratory space, resources, and supplies are identified and included in implementation	<ul style="list-style-type: none"> <li>Classrooms are stocked and set up by the beginning of the school year.</li> </ul>
Develop intensive programs to train or refresh new and existing staff	<ul style="list-style-type: none"> <li>Schedule of STEM related professional development activities</li> </ul>

A strategic plan exists for a natural progression into course/classrooms from grade to grade and subject to subject	<ul style="list-style-type: none"> <li>• Curriculum maps and progressions</li> <li>• Time for planning vertically with other teachers included in schedule</li> </ul>
School schedules allow for adequate time for projects, teacher planning, and non-traditional courses	<ul style="list-style-type: none"> <li>• School schedule is adequate for STEM education</li> <li>• Schedules are prepared in advance of the school year</li> </ul>
Modify current scheduling to allow for adequate time for projects, teacher planning, and non-traditional courses	<ul style="list-style-type: none"> <li>• Adopt either a block schedule or combine courses into blocks such as a STEM block and Humanities Block</li> </ul>
Identify ways in which courses and curriculum can be integrated across multiple STEM disciplines and allow for co-teaching of the material	<ul style="list-style-type: none"> <li>• Schedule teacher preparation period and courses together that will require co-teaching. Also begin using common planning spaces for further collaboration</li> <li>• STEM curriculum team identifies integrative curriculum and provides support to teachers and staff around STEM instruction</li> </ul>
Identify and adopt appropriate technologies aligned to your school's curriculum as well as the your regional workforce needs	<ul style="list-style-type: none"> <li>• Technology needs assessment</li> <li>• Funds/budget aligned for programs, technology, and partnerships</li> </ul>
Arrange classrooms for collaboration and lab or project based experiences	<ul style="list-style-type: none"> <li>• Classrooms have tables and lab benches for students instead of individual desks</li> </ul>
Leadership team regularly evaluates program effectiveness	<ul style="list-style-type: none"> <li>• Data Analysis meetings</li> <li>• Regularly scheduled meetings among leadership, teachers, parents, and community</li> </ul>

## **Instruction**

While partial STEM implementation schools provide traditional schools experiences, they also provide non-traditional STEM experiences either to part of the student body or in specific tracks. Classes may still be the typical length but are highly project or inquiry based and allows students to solve real world problems that are relevant to them. Many offer co-op, internship, or work study programs in addition to the school's normal course offerings. Partial STEM implementation schools are highly collaborative. Teachers have common planning times in order to collaborate. Teachers may be offered the freedom to partner with each other to create new STEM opportunity classes. Teachers collaborate with school partners to integrate those opportunities in the classroom. Students work in teams towards goals. Often the school still has traditional teaching situations in which teachers do not cross collaborate for multidisciplinary units.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Facilitate student participation in problem based learning through STEM investigations, open-ended inquiry, and authentic, real world problems	<ul style="list-style-type: none"><li>• Increased students' time on task and student engagement</li><li>• Use of student self-reflection and assessment</li><li>• Observation of student approaches to investigation of a problem to include collaboration, questioning, data, communication, evidence-based claims, and critical thinking</li></ul>
Use innovative and non-traditional instructional strategies for learning in an integrated educational environment, such as a "flipped classroom" or virtual learning days	<ul style="list-style-type: none"><li>• Curriculum leadership team identifies instructional strategies appropriate for STEM education and project based learning</li><li>• Teachers are provided training for these strategies</li></ul>
Professional development of teachers that provides cross-curricular teamwork and planning	<ul style="list-style-type: none"><li>• Calendar of professional learning activities</li><li>• Peer observation and dialogue</li><li>• Lesson studies</li></ul>
Develop strategies for identifying student abilities, interests, and strengths for continued engagement	<ul style="list-style-type: none"><li>• Data driven decisions; data meetings</li><li>• Teacher/student conferencing and survey data</li></ul>
Employ Contextual learning, Problem-based learning, Project-based learning, and Inquiry-based learning	<ul style="list-style-type: none"><li>• School-wide instructional practice</li><li>• Teacher professional development</li><li>• Teacher collaboration and dialogue</li></ul>
Identify local/regional STEM employment needs and ensure instruction models the skills needed by industry	<ul style="list-style-type: none"><li>• Needs assessment surveying community and businesses, analyze results, and incorporate in school STEM plan</li></ul>
Increase teacher's content knowledge in the fields of STEM, providing explicit instruction on how to integrate content with PBL	<ul style="list-style-type: none"><li>• Align professional development with the instructional calendar</li><li>• Specific instruction to teachers in STEM content</li></ul>

## **Curriculum**

Courses must be aligned to Indiana Academic Standards and Indiana's Common Core Standards. However, the school may create new courses that integrate standards from multiple courses that may span a year or more. Schools may offer licensing, certifications, and possibly associate degrees. These schools offer college-level coursework and workforce skill development. Schools are innovative with scheduling. Classes may be several hours or possibly even the whole day. Courses are strategically scheduled to provide a natural progression from subject to subject. Courses may be combined with multiple teachers spanning multiple periods.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Adopt inquiry and/or project- based curriculum or modify existing curriculum	<ul style="list-style-type: none"><li>• Consistently utilize Inquiry and PBL</li></ul>
Interdisciplinary STEM content is the focus of the school curriculum	<ul style="list-style-type: none"><li>• Curriculum maps reflect STEM focus</li><li>• Concept maps the explicitly show the points of integration in the curriculum</li></ul>
Develop a well-defined set of learning objectives that support teaching for deeper understanding of STEM based on current research on how students learn	<ul style="list-style-type: none"><li>• School based learning objectives</li><li>• Student Learning Objectives for STEM education</li></ul>
Develop a comprehensive K-12 alignment of STEM Standards and assessments	<ul style="list-style-type: none"><li>• STEM progressions through middle and high school</li></ul>
Curriculum is aligned to Common Core State Standards and Next Generation Science Standards, or the state's adopted standards	<ul style="list-style-type: none"><li>• Curriculum maps</li></ul>
Curriculum is connected to real-world contexts and careers in STEM fields, aligned to local or regional needs	<ul style="list-style-type: none"><li>• Curriculum maps reflect this connection</li><li>• Curriculum provides instruction on STEM workforce skills</li></ul>
Research based authentic and integrated assessments are utilized to capture student learning and growth	<ul style="list-style-type: none"><li>• Pre/post tests</li><li>• Innovative or non-traditional assessments</li></ul>
Develop a technology curriculum that can be integrated across all disciplines	<ul style="list-style-type: none"><li>• Curriculum map of technology skills and tools at every level</li><li>• Identified list of tools at all levels that align with curriculum expectations</li></ul>
Opportunities exist for guest speakers, field work, and application of concepts	<ul style="list-style-type: none"><li>• Calendar of in-school and out-of-school opportunities for students</li><li>• Partnerships with business and community</li></ul>

## **Extended Learning**

Learning does not stop at the end of the school day. This type of school offers opportunities outside of the classroom and school through afterschool programs, volunteering, work studies, etc. Often the school staff participates in or even runs the programs for extended learning.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Identify and partner with after school providers to continue educational opportunities in the after school setting	<ul style="list-style-type: none"><li>• Leadership team identifies approved after school programs</li><li>• School provides facilities for conducting after school programs or identifies satellite locations and provides transportation for students</li></ul>
Alignment of the school curriculum and schedule to allow for extended learning activities to continue the work of the school day	<ul style="list-style-type: none"><li>• Transportation opportunities exist for all students</li><li>• Curriculum extension documents connecting in-school curriculum to extended day learning</li></ul>
Bridge and connect in-school and out-of-school learning opportunities	<ul style="list-style-type: none"><li>• Extended Learning curriculum maps</li><li>• Opportunities for after school staff to work with teaching staff</li></ul>
Extended day curriculum is research-based and offered to all students	<ul style="list-style-type: none"><li>• After school program adopts inquiry or project based learning</li></ul>
Parents and community members are included in extended day learning	<ul style="list-style-type: none"><li>• Newsletters, websites, and social networks are utilized to provide information to stakeholders</li><li>• Parents and community members participate in the activities</li></ul>
All students are afforded the opportunity to participate in extended learning but school uses data to identify specific students who could benefit most and encourage participation	<ul style="list-style-type: none"><li>• Struggling students participate in extended learning opportunities</li><li>• General population of students participate as desired</li></ul>

# Elementary/Middle School STEM Minimal Implementation

## Minimal Implementation

This is a traditional school setting. STEM-related problem-based learning is supplemental to the adopted curriculum. This could include separate STEM units, often done at the end of a unit or school year. It could also include short units offered by industry or non-profits such as Project Learning Tree or National Energy Foundation. These units serve to briefly provide STEM experiences to students and develop skills required in the workforce.

## Infrastructure

School support from the administrative team to STEM teachers who provide STEM curriculum during the normal school day. Teachers are provided essential materials and resources to effectively teach the STEM curriculum. Administrators encourage the collaboration of teachers and the integration of STEM in all classrooms. School-wide Professional Development on STEM integration should be provided.

## Action Items

## Metric

Collaborative leadership team (which can include representative from school, district, school board, community, higher education, and STEM industry) develops a shared mission and vision, high expectations for students, end of program goals, and structures for collaboration time and professional learning

- Vision and mission are clearly defined and communicated to all stakeholders.
- Student expectations are shared with teachers, parents, and community members.
- A schedule for collaborative time and plan for professional learning is in place.
- Leadership team meets on a regular basis to monitor program goals and provide guidance and support.

Professional learning communities define roles and responsibilities that align to the mission, vision, goals, and expectations

- Professional Learning Communities are created with a clearly outlined set of roles and responsibilities.

Develop intensive programs to train or refresh new and existing staff

- Schedule of STEM related professional development activities

A strategic plan exists for a natural progression into course/classrooms from grade to grade and subject to subject

- Curriculum maps and progressions
- Time for planning vertically with other teachers included in schedule

Identify and adopt appropriate technologies aligned to your school's curriculum as well as the your regional workforce needs

- Technology needs assessment
- Funds/budget aligned for programs, technology, and partnerships

Arrange classrooms for collaboration and lab or project based experiences

- Classrooms have tables and lab benches for students instead of individual desks

## **Instruction**

Instruction occurs during the typical content area course period and is usually conducted by one teacher or a small group of teachers. Teacher collaboration is important in any school setting. The Minimum STEM immersed school may or may not collaborate for cross-disciplinary instruction. Administration provides support for STEM teachers with professional development, curriculum resources, and materials necessary to effectively instruct students.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Facilitate student participation in problem based learning through STEM investigations, open-ended inquiry, and authentic, real world problems during units of STEM or STEM projects	<ul style="list-style-type: none"><li>• Increased students' time on task and student engagement</li><li>• Use of student self-reflection and assessment</li><li>• Observation of student approaches to investigation of a problem to include collaboration, questioning, data, communication, evidence-based claims, and critical thinking</li></ul>
Use innovative and non-traditional instructional strategies for learning in an integrated educational environment, such as a "flipped classroom" or virtual learning days	<ul style="list-style-type: none"><li>• Curriculum leadership team identifies instructional strategies appropriate for STEM education and project based learning</li><li>• Teachers are provided training for these strategies</li></ul>
Develop strategies for identifying student abilities, interests, and strengths for continued engagement	<ul style="list-style-type: none"><li>• Data driven decisions; data meetings</li><li>• Teacher/student conferencing and survey data</li></ul>
Employ Contextual learning, Problem-based learning, Project-based learning, and Inquiry-based learning	<ul style="list-style-type: none"><li>• School-wide instructional practice</li><li>• Teacher professional development</li><li>• Teacher collaboration and dialogue</li></ul>
Utilizes a variety of technologies that are embedded into the instructional process	<ul style="list-style-type: none"><li>• Teacher models the use of technology</li><li>• Varied tools are included and available for student use</li><li>• Students are using technology tools most of the time in daily work.</li></ul>
Addresses learning gaps and opportunities for higher learning	<ul style="list-style-type: none"><li>• Intervention plan</li><li>• High ability plan</li><li>• Individual student learning plans</li></ul>

## **Curriculum**

Courses must be aligned to Indiana Academic Standards and Indiana's Common Core Standards. However, the school may create new courses that integrate standards from multiple courses that may span a year or more. Schools may offer licensing, certifications, and possibly associate degrees. These schools offer college-level coursework and workforce skill development. Schools are innovative with scheduling. Classes may be several hours or possibly even the whole day. Courses are strategically scheduled to provide a natural progression from subject to subject. Courses may be combined with multiple teachers spanning multiple periods.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Develop a well-defined set of learning objectives that support teaching for deeper understanding of STEM based on current research on how students learn	<ul style="list-style-type: none"><li>• School based learning objectives</li><li>• Student Learning Objectives for STEM education</li></ul>
Develop a comprehensive K-12 alignment of Standards and assessments	<ul style="list-style-type: none"><li>• STEM progressions through middle and high school</li></ul>
Curriculum is aligned to Common Core State Standards and Next Generation Science Standards, or the state's adopted standards	<ul style="list-style-type: none"><li>• Curriculum maps</li></ul>
Curriculum is connected to real-world contexts and careers in STEM fields, aligned to local or regional needs during units of STEM or STEM projects	<ul style="list-style-type: none"><li>• Curriculum maps reflect this connection</li><li>• Curriculum provides instruction on STEM workforce skills</li></ul>
Research based authentic and integrated assessments are utilized to capture student learning and growth	<ul style="list-style-type: none"><li>• Pre/post tests</li><li>• Innovative or non-traditional assessments</li></ul>
Opportunities exist for guest speakers, field work, and application of concepts	<ul style="list-style-type: none"><li>• Calendar of in-school and out-of-school opportunities for students</li><li>• Partnerships with business and community</li></ul>

## **Extended Learning**

Learning does not stop at the end of the school day. This type of school offers opportunities outside of the classroom and school through afterschool programs, volunteering, work studies, etc. Often the school staff participates in or even runs the programs for extended learning.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Identify and partner with after school providers to continue educational opportunities in the after school setting	<ul style="list-style-type: none"><li>• Leadership team identifies approved after school programs</li><li>• School provides facilities for conducting after school programs or identifies satellite locations and provides transportation for students</li></ul>
Alignment of the school curriculum and schedule to allow for extended learning activities to continue the work of the school day	<ul style="list-style-type: none"><li>• Transportation opportunities exist for all students</li><li>• Curriculum extension documents connecting in-school curriculum to extended day learning</li></ul>
Bridge and connect in-school and out-of-school learning opportunities	<ul style="list-style-type: none"><li>• Extended Learning curriculum maps</li><li>• Opportunities for after school staff to work with teaching staff</li></ul>
Extended day curriculum is research-based and offered to all students	<ul style="list-style-type: none"><li>• After school program adopts inquiry or project based learning</li></ul>
Parents and community members are included in extended day learning	<ul style="list-style-type: none"><li>• Newsletters, websites, and social networks are utilized to provide information to stakeholders</li><li>• Parents and community members participate in the activities</li></ul>
All students are afforded the opportunity to participate in extended learning but school uses data to identify specific students who could benefit most and encourage participation	<ul style="list-style-type: none"><li>• Struggling students participate in extended learning opportunities</li><li>• General population of students participate as desired</li></ul>

# Elementary/Middle School STEM Supplemental Implementation

## Supplemental Implementation

Schools may offer STEM experiences that are not a part of the regular school day. This may include but is not limited to afterschool programs, summer programs, school clubs, and academic competitions and fairs.

### Extended Learning

Learning does not stop at the end of the school day. This type of school offers opportunities outside of the classroom and school through afterschool programs, volunteering, work studies, etc. Often the school staff participates in or even runs the programs for extended learning.

Action Items	Metric
Identify and partner with after school providers to continue educational opportunities in the after school setting	<ul style="list-style-type: none"> <li>• Leadership team identifies approved after school programs</li> <li>• School provides facilities for conducting after school programs or identifies satellite locations and provides transportation for students</li> </ul>
Alignment of the school curriculum and schedule to allow for extended learning activities to continue the work of the school day	<ul style="list-style-type: none"> <li>• Transportation opportunities exist for all students</li> <li>• Curriculum extension documents connecting in-school curriculum to extended day learning</li> </ul>
Bridge and connect in-school and out-of-school learning opportunities	<ul style="list-style-type: none"> <li>• Extended Learning curriculum maps</li> <li>• Opportunities for after school staff to work with teaching staff</li> </ul>
Extended day curriculum is research-based and offered to all students	<ul style="list-style-type: none"> <li>• After school program adopts inquiry or project based learning</li> </ul>
Parents and community members are included in extended day learning	<ul style="list-style-type: none"> <li>• Newsletters, websites, and social networks are utilized to provide information to stakeholders</li> <li>• Parents and community members participate in the activities</li> </ul>
All students are afforded the opportunity to participate in extended learning but school uses data to identify specific students who could benefit most and encourage participation	<ul style="list-style-type: none"> <li>• Struggling students participate in extended learning opportunities</li> <li>• General population of students participate as desired</li> </ul>
Modify the school day to allow teachers to participate in the after school activities	<ul style="list-style-type: none"> <li>• Develop a calendar of participation and appropriately adjust the work day to include after school activities during designated times and events</li> </ul>

# STEM Collaborative Partnerships

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## **Higher education**

Higher education plays a particularly important role in STEM education for two parallel reasons: preparing a cadre of STEM teachers and preparing students for STEM careers. It is important to recognize that for higher education to successfully prepare STEM teachers for the classroom and students for the STEM workforce, they may have to change their own instructional practices, recruiting procedures, staffing, and departmental structure.

<b>Action Items</b>	<b>Metric</b>
Increased pre-service teacher preparation for STEM subject matter	<ul style="list-style-type: none"><li>• All newly licensed teachers are required to receive STEM preparation</li></ul>
Provide professional development services to the school and school district pertaining to STEM instruction	<ul style="list-style-type: none"><li>• Professional development is aligned to research based best practices in Science, Math, Engineering, and Technology instruction</li><li>• Professional development is regularly scheduled and ongoing through school year and summer</li></ul>
Higher education staff works with individual teachers on lesson plans, instructional practice, and classroom management	<ul style="list-style-type: none"><li>• Assign school staff to mentor/master educators from the higher education level</li></ul>
Create internship or apprenticeship opportunities for pre-service and new teachers	<ul style="list-style-type: none"><li>• Assign pre-service or new teachers to qualified STEM educators</li><li>• Use teacher evaluation to assess apprentices teacher ability</li></ul>
Provide systems of support to pre-service and new teachers during the apprenticeship	<ul style="list-style-type: none"><li>• System is in place to evaluate and support new teachers</li></ul>

## **Business and Industry**

Businesses are becoming increasingly aware of how they can respond to their own needs as well as those of society by engaging in the community and schools. Indiana's business community has a vested interest in the success of STEM education because they require a well educated pipeline of employees to fill positions now and in the future. Working together, schools and business can create a relationship, benefiting both parties. Schools are constantly looking for resources and this is a wide range from human capital to money to materials. Business and industry can supply resources in the form of supplies and materials. This could be from the basic office supplies all students and teachers need as well lab ware, technology and software, machines, etc. Teachers need a variety of supplies and materials in order to achieve a project or inquiry based classroom. In addition, schools can help the business by allowing appropriate advertising and marketing or logos on newsletters and school equipment. Business and industry can also supply human capital. The experts of a particular field are currently working in that field. Schools need to bring those experts into the classroom to help the teacher with projects and to work with students. This will develop student and teacher interest in the subject.

<b><u>Action Items</u></b>	<b><u>Metric</u></b>
Provide internships for teachers and students	
Participate in professionally developing teachers and school staff	
Work with teachers to create work based projects and real world problem based units and curriculum and provide classroom support	
Lobby school boards for increased STEM education in the classroom	
Provide resources and materials for the classroom	
Promote the STEM and school based achievements within the community	
Participate with after school programs based at the school to improve STEM based activities in the out of school setting	

## **After School/ Extracurricular Providers**

Indiana Afterschool Network	<a href="http://www.indianaafterschool.org/">http://www.indianaafterschool.org/</a>
Indiana First	<a href="http://www.indianafirst.org/">http://www.indianafirst.org/</a>
Seaperch	<a href="http://www.seaperch.org/index">http://www.seaperch.org/index</a>
FIRST LEGO League	<a href="http://firstlegoleague.org/">http://firstlegoleague.org/</a>
Boy and Girls Clubs	<a href="http://www.bgcindy.org/">http://www.bgcindy.org/</a>
YMCA	<a href="http://www.indymca.org/">http://www.indymca.org/</a>
Noble of Indiana	<a href="http://www.nobleofindiana.org/">http://www.nobleofindiana.org/</a>
Summer Advantage	<a href="http://www.summeradvantage.org/">http://www.summeradvantage.org/</a>
NASA Ignite	<a href="http://www.wisdomtools.com/nasa-ignite/">http://www.wisdomtools.com/nasa-ignite/</a>
Big Brothers Big Sisters	<a href="http://www.bebigforkids.org/site/c.6fIMIZMzFIJ0H/b.6547283/k.EF6B/Home_Page.htm">http://www.bebigforkids.org/site/c.6fIMIZMzFIJ0H/b.6547283/k.EF6B/Home_Page.htm</a>
Girls Inc. Operation SMART	<a href="http://www.girlsinc.org/about/programs/operation-smart.html">http://www.girlsinc.org/about/programs/operation-smart.html</a>
4-H	<a href="http://www.4-h.org/youth-development-programs/4-h-science-programs/">http://www.4-h.org/youth-development-programs/4-h-science-programs/</a>
ACE Mentor Program	<a href="http://www.acementor.org/">http://www.acementor.org/</a>
Expanded Schools	<a href="http://www.expandedschools.org/">http://www.expandedschools.org/</a>
AYS Kids	<a href="http://www.ayskids.org/">http://www.ayskids.org/</a>
After School All Stars	<a href="http://www.afterschoolallstars.org/">http://www.afterschoolallstars.org/</a>
Camp Fire	<a href="http://campfireusa.org/">http://campfireusa.org/</a>
You for Youth	<a href="http://y4y.ed.gov/">http://y4y.ed.gov/</a>
Find Youth Info	<a href="http://www.findyouthinfo.gov/">http://www.findyouthinfo.gov/</a>